CASE REPORT

Sepsis + ptosis = an unusual diagnosis

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SUMMARY

The authors present the case of a 19-year old man presenting to the emergency department with a 2-day history of left eye pain and ptosis, facial pain around the maxillae, coryza, headaches and fevers. He had a background of autism, mild learning disability, obsessive-compulsive disorder and asthma. Within the last month, his risperidone and sertraline doses had been increased. Basic observations and investigations suggested sepsis: tachypnoea, sinus tachycardia, fever and a raised white cell count and C reactive protein level. A CT head showed sinonasal polyposis and moderate chronic rhinosinusitis, with normal intracranial appearances. An MRI head showed evidence of extension of frontal sinus infection through the posterior wall of the left frontal sinus with subsequent left frontal extradural empyema. Intravenous antibiotics and surgical drainage of the left frontal sinus resulted in clinical improvement and discharge to complete the course of antibiotics in the community.

BACKGROUND

This case highlights a common finding in the emergency department of sepsis of unknown origin and emphasises the need for a high awareness of less common sources, such as those intracranially. Intracranial complications of sinusitis are rare but can cause significant morbidity and mortality with disabling neurological sequelae if not rapidly recognised and treated. It is important to understand

that effective treatment requires a multidisciplinary approach and aggressive antibiotic therapy with neurosurgical intervention as necessary.

CASE PRESENTATION

A 19-year-old man presented to the emergency department with a 2-day history of left eye pain, facial pain around the maxillae, coryza, headaches and fevers. He had a background of autism, mild learning disability, obsessive-compulsive disorder and asthma, and within the last month his risperidone and sertraline doses had been increased. Other features included photophobia associated with the eye pain, leg cramps and restlessness. The patient was a non-smoker, non-drinker, with no relevant social or family history. On examination he was tachypnoeic in sinus tachycardia at 136 beats per minute, with a normal blood pressure and fever at 39.1°C. Partial ptosis and diplopia of the left eye was noted with all other cranial and peripheral nerves intact. There were normal findings in the remaining systemic examination.

INVESTIGATIONS

Blood tests revealed a raised white cell count (17) and C reactive protein (CRP; 104). Preliminary investigations of a chest X-ray and urinalysis to identify a source of infection revealed no abnormalities. A CT head was performed to investigate an intracranial cause of the symptoms. This was reported as showing sinonasal polyposis and moderate chronic rhinosinusitis (more prominent on the left), with normal intracranial appearances and no signs of acute sinusitis. The patient was transferred to the ears, nose and throat (ENT) ward, and after 2 days of persistent tachycardia and fever despite antibiotic treatment had an MRI head showing evidence of extension of a frontal sinus infection through the posterior wall of the left frontal sinus with subsequent left frontal extradural empyema (figure 1, figure 2). Blood cultures taken from the emergency department demonstrated a beta-haemolytic group A streptococcal bacteraemia.

TREATMENT

Initial management in the emergency department included intravenous paracetamol, intravenous fluids and intravenous broad-spectrum antibiotics. The antibiotics were changed to narrow spectrum once on the ENT ward, to target central nervous system infection and bacteraemia. This medical management was followed by surgical drainage of the left frontal sinus after the patient had a self-terminating seizure. Serial MRI scans were used to

Figure 1 MRI head showing left paranasal sinus infection.

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Figure 2 MRI head showing left frontal extradural empyema (extension of the left frontal sinus infection through the posterior wall of the sinus).

monitor the intracranial empyema, which remained stable in size and did not require drainage.

OUTCOME AND FOLLOW-UP

The patient clinically improved thereafter with no further seizure activity and was discharged home to complete a 6-week course of intravenous antibiotics and 6 months of antiepileptic therapy. He was also commenced on fluticasone nasal spray for rhinitis to reduce the risk of future sinusitis. He tolerated the antibiotics without any adverse symptoms, remaining well and stable over the course of the treatment. At the end of the treatment period, CRP was less than five with normal full blood count and renal function. A follow-up MRI has been booked to monitor the resolution of the infection.

DISCUSSION

Sinusitis is the inflammation of the mucosal lining of the paranasal sinuses and is a common upper respiratory tract infection affecting one in eight people.¹ Acute sinusitis is more common in children while the chronic form is more frequently seen in adults; and both types can cause intracranial complications.² Although the incidence of complications of sinusitis is rare (3%–11% of sinusitis cases), they can be associated with a high morbidity and mortality as a result of the neurological consequences.³

The bacteria implicated in acute sinusitis are the aerobes: *Streptococci*, *Staphylococci* and *Haemophilus influenzae*. The primary infection can spread in a variety of ways. There can be direct extension of the infection through bony contiguity, retrograde thrombophlebitis in the valveless diploic veins of the skull base that penetrate the dura or haematological spread of septic emboli.^{3,4} Through these mechanisms, sinusitis can be complicated by secondary meningitis, subdural and extradural empyemas, intracerebral abscesses and cavernous sinus thromboses.^{1,4} For example, a case has been reported of subdural

empyema secondary to acute odontogenic sinusitis following tooth extraction.⁵

The spread of infection appears to particularly affect the frontal skull due to the rich diploic venous network that penetrate the skull base and the rapid growth of the frontal sinuses with their blood supply in adolescents.² In this way, frontal sinusitis most frequently progresses to intracranial abscesses, whereas meningitis or cavernous sinus thrombosis follows ethmoid or sphenoid sinusitis.⁴

Young males (20–30 years old) are the demographic most commonly affected by intracranial complications. Other risk factors include diabetes, renal failure, non-steroidal anti-inflammatory drug use, HIV infection and history of facial trauma. Chronic sinusitis that has been repeatedly treated, developing a greater antibiotic resistance, may also put a patient at greater risk.^{3,6}

Presenting features of headache (as in our case), meningism, changes in consciousness and seizures⁶ may indicate an intracranial complication in the context of sinusitis, although fever is not a sensitive predictor (present in 50%–58%).³ An acute onset with early development of focal neurology suggests a subdural empyema, which forms more rapidly than an extradural empyema. With the latter the infection expands slowly between the closely adhered layers of the dura and the skull, and so the presentation is usually insidious with non-specific symptoms. In children, there is commonly a lack of any focal features for all types of intracranial complication.²

CT with contrast may identify complications and is easily obtained in emergency situations, although MRI is more useful for assessing intracranial extension.³

Medical treatment with aggressive culture-based antibiotic therapy is paramount. Medical management only may be sufficient in cases of meningitis¹ and cautiously selected abscesses of limited size where there are no neurological signs. Neurosurgical drainage of the affected sinus and abscess in combination with antibiotic therapy is required for most cases. As in our case, antiepileptic medications can be used prophylactically for intracranial complications.⁶ Currently, corticosteroids are indicated only in life-threatening cases of intracranial hypertension and cerebral oedema and are not recommended routinely.³ With all these strategies, the management approach should be multidisciplinary, with input from otolaryngologists, microbiologists, radiologists and neurosurgeons.¹

Morbidity and mortality arise from effects of sepsis, raised intracranial pressure, transtentorial herniation, thrombosis dissemination and infarction. This can leave 13%–35% of survivors with a long-term neurological consequence such as hemiparesis, aphasia, epilepsy and visual deficits.² The prognosis is dependent on the nature of the neurological signs and the timings of diagnosis and commencement of treatment,³ necessitating

Learning points

- ▶ This case highlights a common finding in the emergency department of sepsis of unknown origin, emphasising the need for a high awareness of intracranial sources.
- ▶ Intracranial complications of sinusitis are rare but severe.
- ▶ Significant morbidity and mortality with disabling neurological sequelae can ensue if not rapidly recognised and treated.
- ▶ Management is multidisciplinary, with aggressive antibiotic therapy and neurosurgical intervention as necessary.

the need for a high index of suspicion to aid rapid diagnosis and initiation of aggressive medical therapy and neurosurgical intervention.

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